Abstract Submitted
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Carrier Multiplication Effects Between Interacting Nanocrystals for Solar Cell Applications[1] IVAN MARRI, MARCO GOVONI, STEFANO OSSICINI, University of Modena and Reggio Emilia, Department of Science and Methods for Engineering, via Amendola 2, 42122 Reggio Emilia, Italy — Carrier multiplication is a carrier relaxation process that results in the generation of multiple electron-hole pairs after absorption of a single photon. Such effect can potentially increase power conversion efficiency in solar cells by minimizing effects induced by thermalization loss processes.The possibility of increasing carrier multiplication efficiency by exploiting nanocrystals interplay have been recently demonstrated in both PbSe [2] and Silicon [3] [4] strongly coupled nanocrystals. In this talk we will analyze the role played by nanocrystal-nanocrystal interaction on carrier multiplication dynamics considering a system of interacting silicon nanoparticles. Using first-principles calculations, quantum cutting energy-transfer processes will be quantified and a new carrier multiplication effect, defined by us Coulomb driven Charge Transfer, will be introduced. Conditions that maximize effects induced by nanocrystals interplay on Carrier Multiplication dynamics will be pointed out and the role played by wavefunctions delocalization will be clarified [5].

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